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MEMORANDUM

SUBJECT: Flumetsulam: "May Effect" for Endangered Species and the Value of Requiring Additional Information

FROM: Anne L. Barton, Director
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TO: Douglas D. Campt, Director
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Thank you for your request. This memorandum summarizes the scientific data and conclusions regarding the endangered species "may affect" for flumetsulam.

Does an Endangered Species "may affect" exist for flumetsulam?

Yes, based on the scientific criteria for determining potential effects of pesticides to endangered plant species, the use of Flumetsulam on corn and soybeans "may affect" endangered plant species that grow in wetland habitat.

Endangered plant species in wetland habitats near corn and soybean fields may be exposed to flumetsulam concentrations, via surface runoff, that exceed the endangered species level of concern.

What criteria were used to determine the may effect?

LEVEL OF CONCERN - A "may affect" exists if EEC $\geq$ EC25 for most sensitive plant species tested, and exposure is likely.

The estimated environmental concentration (EEC) for wetland plants ranged from 0.09 il ai/A to 0.23 il ai/A. This exceeds the seedling emergence EC_{25} of 0.0016 il ai/A with cucumber, the most sensitive plant species tested. Thus, the endangered species level of concern (LOC) is exceeded 144 times. The EEC is based upon fate models. Thus the assessment id considered to be "refined".

Exposure is likely if plant is "known" or "possible" in a county and habitat

information does not indicate sufficient distance from treatment site.

Thirty-five endangered plant species grow in wetlands and occur in counties where corn and/or soybeans are produced[1]. Flumetsulam runoff will likely result in contaminated water reaching wetlands.

What do the plant toxicity test endpoints tell us?

Seed Germination: The EC25 is the concentration applied to soil that results in a 25 percent reduction in the ability of germinated seeds to survive.

Seedling Emergence: The EC25 is the concentration applied to soil that results in a 25 percent reduction in seedling emergence, either in number of seedlings emerging, or length of emerging seedling.

Vegetative Vigor: The EC25 is the concentration applied to foliage that results in a 25 percent reduction in vegetative vigor, or growth of plants.

A consensus of academia, environmental groups, NACA and EPA concludes that a plant is unlikely to recover from a 25% reduction.

What is the quality and value of the data that were used for determining "may affect"?

The data used to determine may effect to plants were scientifically sound and of high value.

What is the value of the additional data being requested?

There are two types of data being requested: (1) additional testing, and (2) information on locations of endangered plant species relative to corn and soybean use sites.

(1) The additional plant testing that EEB is requesting would be of minimal value for endangered plant species assessment. The results would not likely change the "may affect" conclusions. However, the additional testing it is of high value for non-target plant species risk assessment (not endangered species), since it may well yield a substantially lower level of concern. thus indicating greater potential risk to nontarget plants and wider impact on the ecosystem.

(2) The additional information on the locations of endangered plant species

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[1] Counties were included if they had more than 100 acres of corn and/or soybeans. Acreage of less than 100 acres in a county is not likely to result in exposure to endangered plant species.

relative to corn and soybeans is of very high value for endangered species "may affect" since it would help determine whether endangered plants may actually be exposed to flumetsulam.

Attached are three appendices which contain addition information on the "may affects" determination for flumetsulam, the value of the additional information, and some general information on "may affect" considerations herbicides and endangered plants. Please contact Anthony Maciorowski or myself if you have any questions.

APPENDICES

APPENDIX I - ADDITIONAL SUPPORT FOR FLUMETSULAM "MAY AFFECT" DETERMINATION

The terrestrial plant seedling emergence EC25 was compared to estimated exposure levels based on EFGWB PRZM-EXAMS modeling. Since Flumetsulam is proposed for ground application only, the expected route of exposure is surface water runoff. Drift is expected to be minimal, and does not represent a risk to non-target plants, including endangered species. Assuming flumetsulam would be transported by surface water runoff into wetlands, the EFGWB modeled the estimated concentrations in water receiving such runoff.The EEC calculations were made assuming that no endangered plant species occur within 200 feet of any corn or soybean fields. These concentrations in water were used to estimate the amount of chemical possibly reaching wetland soil where endangered plants could occur. The estimated exposure for wetland plants ranged from 0.090164 lb ai/A to 0.229508 lb ai/A. This exceeds the seedling emergence EC_{25} of 0.00159 lb ai/A with cucumber, which was the most sensitive species based on tests provided. Thus, the highest exposure level is 144 times greater than the endangered species level of concern.]

APPENDIX II - REASON AND VALUE OF ADDITIONAL SEEDLING EMERGENCE TESTING

a. The registrant has provided sufficient plant toxicity information to allow a conclusion that the use of Flumetsulam may affect endangered plant species.

However, based on the following information, additional testing with a prolonged exposure period and more sensitive species is considered valuable for characterizing the extent of risk to nonendangered plants.

i. Although, the registrant had tested twelve species per the seedling emergence SEP recommendations, only three species were shown to have inhibition greater than 25% (rape, cabbage and cucumber) at the maximum label rate. Sugar beets, for example, did not show much inhibition. This seems inconsistent with the label precaution which restricts growing sugar beets for 22 months after treatment.

ii. According to the label, this chemical is to be applied as preplant incorporated, preemergence and post emergence. The first two applications indicate a soil active herbicide. The seedling emergence study is supposed to show soil activity of the herbicide. Yet, very little activity was shown for the species tested.

iii. The mode of action of this chemical is described by the registrant as adsorption through foliage/root uptake and translocation involving the inhibition of acetolactate synthase (ALS). A known response of ALS inhibition is "slow" death symptom at very low concentrations. Yet, little herbicidal activity was shown overall; possibly because the test was only conducted for two weeks.

b. Value of additional testing

The **value of added information** for requesting this testing is high for characterizing the extent of potential risk to non-target nonendangered plant species but low for determining may affect to endangered species.

i. Value of additional testing for **nonendangered** plant species

The existing test data are scientifically sound and yield results which allow flumetsulam to be characterized with a given level of hazard. With that hazard, risk has been assessed. The risk to non-target plants is presumed to be high based on existing scientifically sound test data.

The additional testing may yield a lower seedling emergence EC25 than the existing studies. A risk assessment using a lower EC25 would conclude greater

potential risk with the current estimates of exposure. With a lower EC25, there would be greater confidence that hazard to plants was understood and risk to plants had been adequately characterized. The additional seedling testing cannot reduce the extent of presumed risk, but is expected to increase it.

ii. Value of additional testing for **endangered** species

The available toxicity information is adequate to make the determination that estimated exposure levels exceed endangered species criteria for plants. The additional seedling emergence test data will not change the "may affect" situation for endangered plant species.

APPENDIX III - ADDITIONAL INFORMATION FOR "MAY AFFECT" CONSIDERATIONS

1. Based on my understanding of how the Fish and Wildlife Service thinks, they would conclude that if we cannot ascertain that "no effect" would occur, then we have a "may affect".

2. A "no effect" can be based (a) on toxicological/estimated concentration information that indicates our criteria of concern have not been exceeded, or (b) on no exposure of the species to the pesticide regardless of toxicity (effectively means that the estimated concentration equals zero).

The discussion immediately below focuses on (b) and the generic aspect of (a); the discussion beginning with "B. FLUMETSULAM AND IT'S AFFECT ON ENDANGERED PLANT SPECIES" deals specifically with flumetsulam.

3. There are several aspects relating to "exposure" vs. "no exposure". Many of these relate to inadequate data. In general, we do not have definitive data on where listed plants are relative to treatment sites; if this information is available, then we need only consider how far apart the listed species and treatment site(s) are, and how far the herbicide will transport.

a. We cannot account for secondary drift due to volatilization or wind blown transport bound to soil particles. These will have to be considered on a case-by-case basis.

b. For other herbicides, I would propose that

- for fields that have been in cultivation for more than two years, listed plants are very unlikely to be within 200 feet of the edge of the fields or the plants are not sensitive to herbicides. Therefore, absent information to the contrary, we do not need to consider effects within 200 feet.

- for ground applications in cultivated crops, drift is not a factor, and the primary concern is transport of soluble herbicides in runoff water that may reach listed "wetlands" plants (e.g., flumetsulam). Such transport could occur across considerable distances.

- in cultivated crops, plants within two miles could be exposed by aerial applications that approximate ULV. For non-ULV aerial applications, plants within one mile could be exposed.

- in uncultivated areas (rights-of-way, rangeland, etc.) listed plants may

be actually in the treatment area. Drift and runoff may add to concerns, but concerns cannot be negated on the basis of no drift or no runoff when the plant can be treated directly.

c. Our county data base has two categories: "known" and "possible".

- Where a listed plant species is "known" to be in a county, we have an automatic "may affect" for an herbicide that gets off-site (>200 feet from the treated field), unless habitat information is available and indicates that the species cannot be near the treatment site.

- The term "possible" in our data base is used in the broadest sense (see attached disclaimer from our data base). It may be "very likely" or "very unlikely". In either case, nobody has found it and if anybody has looked, searching has not been sufficiently widespread to conclude its absence. Although it is not our intention to list historical (only) locations, it is very likely that at least some of our "occurrence" information is only historical.

- Where habitat information is available for a "possible" plant species, it may be adequate to conclude either that the appropriate habitat is near or far from the treatment site. If suitable, but unsearched (to our knowledge) habitat is close enough to the treatment site, this should be considered a "may affect". If suitable habitat is sufficiently distant from the treatment site, this is a "no effect".

- Where no locality or habitat information is available, a judgement must be made as to whether exposure is likely. It appears essential that some relevant information must be obtained to provide guidance for making a judgement either way. In other words, if we know essentially nothing, we must find out some information before making a judgement.

4. The toxicological criteria for determining may affect to endangered plant species are presented below.

The terrestrial plant endpoint, with which exposure is compared to determine if endangered plants may be affected, is the EC25 from one of three types of plant studies. The purpose of the three types of plant studies is to measure the effect the chemical would have on the plant at various life stages including germination, emergence and maturity.

The seed germination and seedling emergence studies measure the phytotoxic effect of the chemical in the soil. The vegetative vigor study measures the phytotoxic effect of the chemical on the foliage of the plant. The endpoint of each study type is an

EC25 which reflects the degree of inhibition experienced by the plant.

This 25% reduction represents the level of effect from which the plant is unlikely to recover as determined by consensus of academia, environmental groups, NACA and EPA.